

THE ROLE OF EARLY LIFE-HISTORY STAGES IN DETERMINING ADULT SPATIAL PATTERNS OF ENCRUSTING SPONGES.

Memoirs of the Queensland Museum 44: 616. 1999:- We studied the abundance and spatial pattern of two Mediterranean encrusting sponges: *Crambe crambe* (highly toxic) and *Scopalina lophyropoda* (non-toxic) at three spatial scales (0.5, 1 and 2m²). We examined the reproductive output, larval behaviour and early recruitment in these species, and assessed the relative importance of these parameters in explaining the abundance and spatial patterns of adults. We also determined, in field experiments, whether the presence of adults induces or inhibits recruitment in these two species. We found that *C. crambe* was much more abundant than *S. lophyropoda* at the site studied in both number of individuals per square meter (67±2.7 vs. 10.2±2.1, mean±SE) and coverage (47±1.9% vs. 11.1±1.4%). At the smallest scale sampled (0.5m²), both species showed an aggregated pattern. Aggregation was also detected for *S. lophyropoda*, but not for *C. crambe*, at the scales of 1 and 2m². The number of embryos incubated per cm² by *C. crambe* and *S. lophyropoda* was 76.2±12.5 and 14±1.7 (mean±SE), respectively. We estimated that the potential number of larvae of *C. crambe* released into the water column was about 20 times higher than that of *S. lophyropoda*.

Larval behaviour was monitored in the laboratory and in the field. Larvae of *S. lophyropoda* did not swim away from the release point. They maintained a vertical posture that minimised horizontal dispersal, and soon began crawling. In contrast, the larvae of *C. crambe* swam actively and had a comparatively delayed crawling phase. Recruitment of the two species in scraped quadrats surrounded by individuals of *C. crambe* and *S. lophyropoda*, and in controls (rocky areas with no sponges) was monitored weekly

for a month. Recruitment of both species was higher in scraped quadrats surrounded by conspecifics. This effect was notably more marked for *S. lophyropoda* than for *C. crambe* recruits. The toxicity of *C. crambe* did not inhibit settlement of *S. lophyropoda* with respect to controls. The mean number of recruits per surface unit after one month (all substrates pooled) was ca. 3.5 times higher for *C. crambe* than for *S. lophyropoda*. This difference was smaller than expected given that larval production of *C. crambe* was ca. 20 times higher. This indicates that a significant proportion of *C. crambe*'s offspring did not contribute to the maintenance of the local population. The aggregated pattern of *S. lophyropoda* at scales ranging from 0.5-2m² and its discontinuous geographic distribution may be partially explained by strong philopatry of its larvae due to their poor swimming ability and limited dispersal. The dominance of *C. crambe* in littoral assemblages, its random distribution at scales larger than 0.5m², and its ubiquity along the littoral are traits that are consistent with high reproductive output, the swimming behaviour of larvae which facilitates wide dispersal, and patterns of recruitment found in this study. Therefore, *S. lophyropoda* populations appear to be maintained by offspring supplied by autochthonous individuals while populations of *C. crambe* appear to be open, with a potentially significant flow of larvae between them. □ *Porifera, reproductive output, larval behaviour, settlement, recruitment, spatial patterns, encrusting, Mediterranean Sea.*

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